INTEX-NA mission science and field measurements of OVOC and tracers

Investigator: H. B. Singh (P. I.), L. Salas, D. Herlth, R. Kolyer, L. Pfister, and R. Selkirk, NASA Ames Research Center, Moffett Field, CA 94035

During the summer 2004 INTEX-A deployment, our efforts will be dedicated to two main activities: (1) H. Singh will carry out the duties of the Mission Scientist and Inter-agency Coordination Lead; and (2) we will perform measurements of oxygenated volatile organic chemicals (OVOC) and tracers using the PANAK (PAN/Aldehyde/Ketone) instrument aboard the NASA DC-8.

The mission science role will involve leading and coordinating the overall INTEX-A scientific effort to achieve stated project objectives and to perform several pre- and post mission activities. Mission science responsibilities will require working closely with the mission meteorologist, forecasting team, members of the science team, navigators, and mission managers to plan and coordinate day-to-day activities. The aim will be to accomplish INTEX-A goals of inter-comparisons, large-scale characterizations, large-scale outflow events, chemical aging over Atlantic, convective venting, satellite validation, and targeted activities that may involve "suitcase missions". These activities will require close coordination of the DC-8 with several non-NASA platforms.

The Ames PANAK instrument will be integrated aboard the NASA DC-8 and operated during the entire duration of the intensive phase. This is a computerized 3-channel Capillary Gas Chromatographic system designed for the collection and analysis of low-ppt levels of peroxyacyl nitrates (PANs), alkyl nitrates, and tertrachloroethene in Channels 1 and 2; and C_2-C_3 aldehydes, C_1-C_2 alcohols, C_3-C_4 ketones, and C_1-C_2 nitriles in channel 3. Channels 1 and 2 use ECD detectors and have a sampling frequency of 2.5 minutes. Channel 3 uses a Photo Ionization detector placed in series with a Reduction Gas detector and has a sampling frequency of 5 minutes. The main manifold draws 5 SL/min of ambient air through a heated Teflon lined probe from which each of the three instrument channels draws a 200 ml aliquot of sample air. This aliquot is dried by passing it through a –35 ˚C cold trap, cooled to -140 ˚C for constituent pre concentration, and then heat desorbed into the gas chromatographic columns. All calibrations are performed in-flight by using an installed dilution system and in a manner that mimics

ambient air sampling. Primary standards are generally referred to a series of permeation tubes. In addition high concentration standards are also carried on board. Sensitivities under typical conditions are: 1-3 ppt PANs, 1-5 ppt alkyl nitrates, 5-20 ppt OVOC, and 20-30 ppt nitriles. Accuracies and precisions of the order of ±20% and ±10% are expected. A schematic of this instrument is provided below.